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ABSTRACT

In two phases, this study examined age-related changes in children's knowledge about two familiar domains and how these domains are organized in permanent memory. Forty 5-year-olds and 40 7-year-olds from a small academic community generated exemplars from the animal and cartoon character domains and provided information about sets of animals and cartoon characters. It was found that the production of exemplars increased with age, and children tended to report more animals than cartoons. Interpretations of clusters evident in children's protocols were similar for each age and reflected prior knowledge. The production of information also increased with age, and varied according to type of information and domain. It was concluded that the findings provide evidence of age changes in knowledge and serve as a critical base for future examinations of the influence of prior knowledge on memory. (Author/RH)

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EXPLORING CHILDREN'S KNOWLEDGE ABOUT ANIMALS AND CARTOON CHARACTERS

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Running Head: Children's Knowledge

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Abstract

The present two-phase study examined age-related changes in children's knowledge about two familiar domains and how these domains are organized in permanent memory. Children at two ages, 5-, and 7-year-olds, generated exemplars from the animal and cartoon character domains and provided information about sets of animals and cartoon characters. The production of exemplars increased with age, and children tended to report more animals than cartoons. The order in which items were reported was used to examine how these items are arranged. Interpretations of clusters evident in children's protocols were similar for each age and reflected prior knowledge (e.g., size, habitat). The production of information also increased with age, and varied according to type of information (e.g., action), and domain. These results provide evidence of age changes in knowledge and serve as a critical base for future examinations into the role of prior knowledge on memory.

Introduction

This investigation reflects the current focus within the areas of memory development and adult cognition literature on the influential role of prior knowledge in the determination of performance on memory-related tasks (e.g., Chi, 1978; Chi & Koeske, 1983; Lindberg, 1980; Ornstein & Naus, in press). With increases in age there are corresponding increases in knowledge about the world, about language, and about particular subject domains. These knowledge differences may, in turn, account for age-related differences in memory. Although several demonstrations of the significant relation between prior knowledge and memory performance exist (e.g., Chi, 1978; Chi & Koeske, 1983; Chiesi, Spilich, & Voss, 1979; Lindberg, 1980), there have been relatively few accounts of the contents or organization of the developing knowledge base (e.g., Chi & Koeske, 1983; Hayes & Ornstein, 1985). The present study was designed to examine how the knowledge base changes systematically with age. More specifically, the two-phase investigation described was conducted to document age changes in 5- and 7-year-olds' knowledge of animals and cartoon characters, and to explore how exemplars from these domains might be organized or related in permanent memory. To examine these age differences two tasks were employed. In the first task, a free emission procedure, children were asked to name exemplars from the targeted domains.

The second task, an identification interview, encouraged the same children to generate information about exemplars of animals and cartoon characters.

Method

The participants in the present study were 40 five- and 40 seven-year-olds from a small academic community. A 2 x 2 x 2 design incorporated the following independent variables: Age of subjects (5 or 7 years), presentation mode (pictures or words), and domain (animals or cartoon characters). The latter variable was a repeated factor; all subjects generated and provided information about both animals and cartoon characters.

Children participated in a two-phase examination of the contents and organization of the developing store of knowledge in permanent memory. In the first phase, a free emission task, children generated exemplars from the animal and cartoon character domains. The second phase of the study consisted of an identification interview in which children provided information about sets of animals and cartoon characters. In order to assess the effect of pictorial presentation on the accessibility of this knowledge, half of the subjects were presented the items in pictorial form (black and white line drawings) and the remaining children were presented the items verbally.

Results

The results are presented in two sections: Free emission task and identification interview.

Free Emission Task

Children's productions of exemplars from the animal and cartoon character domains were examined for the number of items generated and the order in which the items were reported. In general, the production of exemplars increased with age, with the 7-year-olds (M = 8.43) reporting more items than the 5-year-olds (M = 6.53). Interestingly, children generated more animals (M = 9.52) than cartoon characters (M = 5.14). Consistent with these observations, an analysis of variance with age as the between-subjects factor and domain as the within-subjects factor indicated three significant effects: Age, F (1,78) = 12.52, p < .001; Domain, F (1,78) = 101.66, p < .001; and Age x Domain interaction, F (1,78) = 19.07, p < .001, reflecting the animal-cartoon character difference observed in the 7-year-olds' protocols.

The order in which exemplars were reported was used to construct "next-to" similarity matrices that were, in turn, used to generate multidimensional scaling solutions. The graphic representations (or spaces) resulting from these analyses indicated that the underlying dimensions or relationships between items were quite similar at ages 5 and 7. That is, the interpretations of the resulting spaces for each age were quite similar and reflected children's shared knowledge about the items (e.g., size, habitat, action). Children tended to report animals that were associated by

size (large vs. small), habitat (jungle/zoo vs. farm), and mode of transportation (four legs vs. two legs), while they were more likely to group cartoon characters according to their "environments" (Walt Disney World vs. Bugs Bunny Show) and category (human vs. animal). Sample dimensional spaces for the cartoon characters generated are presented in figures 1 and 2.

Identification Interview

The children's responses were classified into 1 of 11 response categories (see Hayes & Ornstein, 1986) reflecting properties and features of the items (e.g., action, function, appearance). Figure 3 presents sample responses (and codes) to "elephant." Children responded eagerly to 98% of the animals and cartoon characters. The information generated about these items ranged from information about what an item looks like to where an item lives. In general, there were age-related increases in the number of responses produced about the items, with the 5- and 7-year-olds producing 2.95 and 4.48 responses, respectively. In addition, children tended to generate more information about the items in the pictures condition (M = 4.25) than in the words condition (M = 3.18). It was also observed that children generate more information about animals (M = 4.03) than about cartoon characters (M = 3.04). Consistent with these observations, an analysis of variance with age and mode of presentation as the between-subjects factors and domain as the within-subjects variable indicated significant

effects of Age, F (1,76) = 19.22, $p < .001$; Mode of Presentation, F (1,76) = 14.69, $p < .001$; and Domain, F (1,76) = 30.05, $p < .001$. In addition, there was significant age x domain interaction, F (1,76) = 14.69, $p < .001$.

Examination of the overall patterns of responding indicated age-related changes in the type of information generated about the stimuli. Thus, for five of the response categories (appearance, category, environment, factual, function), the 7-year-olds produced more responses than the 5-year-olds. There were, however, six categories (action, example/synonym, idiosyncratic, social relations, episode, other) in which no age differences were observed. In addition to changes in levels of responding according to response category, the elicitation of information varied as a function of domain.

Conclusions

With increases in age there are demonstrated changes in children's knowledge base in permanent memory. These changes have been suggested to explain, in part, observed improvements on memory-related tasks. The present study describes explicitly what information about common objects includes and how this information might affect retrieval and organization.

The production and identification data provide a systematic characterization of the changing nature of children's knowledge about two salient domains, namely animals and cartoon characters.

Typical developmental trends were observed in the generation of exemplars from these domains, as well as in the elicitation of information about sets of animals and cartoon characters. In general, children tended to respond with more information about animals than cartoon characters and, indeed, provided more exemplars of animals than cartoon characters.

The organization or arrangement of these domains was quite similar at each age. That is, the 5- and 7-year-olds tended to group items according to similar dimensions that reflected prior knowledge about the items (e.g., size). The elicitation of information about the sets of items varied according to the type of information provided and domain. Children were more likely to provide action, environment, and appearance information about animals, whereas they were more likely to generate category and appearance information about cartoon characters.

This investigation provides critical systematic accounts of the contents and organization of the young child's developing knowledge base in permanent memory. The present findings clearly suggest the importance of considerations of "prior knowledge" and examinations of domain or category differences in explanations of developmental improvements on memory.

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HEMAN

ROAD RUNNER

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MICKEY MOUSE

DAFFY DUCK

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